

## PHYSICS 106 - Spring 2006

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**Lecture:** T, R: 8:00 a.m. – 8:50 a.m. Room: Physics 5

**Lecturer:** Dr. Costas M. Soukoulis A519 Zaffarano Hall 294-2816  
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**Course Web Site:** <http://cmp.ameslab.gov/physics106>

### Recitation

**Instructor:** \_\_\_\_\_ Office: \_\_\_\_\_  
Phone: \_\_\_\_\_ Hours: \_\_\_\_\_

### Laboratory

**Instructor:** \_\_\_\_\_ Office: \_\_\_\_\_  
Phone: \_\_\_\_\_ Hours: \_\_\_\_\_

**TEXT:** "The Physics of Everyday Phenomena", by W. Thomas Griffith, 4<sup>th</sup> Edition, McGraw-Hill. A study guide is available but not required. You will also need to purchase the laboratory manual.

**COURSE STRUCTURE:** There are three parts: Lecture, Recitation, and Laboratory. These are designed as a unit and you are expected to participate fully in all three. Your comprehension of material covered in lecture will be tested in the two one hour exams as well as the comprehensive two hour final exam. In addition to your exam scores, you will receive scores for your laboratory and recitation performance. These five scores when added together will determine your overall grade for the course. See **Course Grade** below.

**LECTURE:** Here the main ideas in the assigned material will be outlined and developed. To get maximum benefit from lecture, you are advised to read the assigned material before coming to lecture. All students are expected to attend class. Students will frequently be asked to respond to multiple-choice questions in class using "flash-cards" or "clickers" provided in class. One of the purposes of this is to let the instructor know how well the subject matter is being communicated to the students, so that he may adjust the pacing of the lectures accordingly. In-class exercises will be also held on any day, unannounced. The extra points gained by these exercises will help improve your grade.

**HOMEWORK** will be assigned and graded; homework is due at the beginning of your recitation section. Here you will present your homework and your recitation instructor will discuss the problems assigned. Solutions to assigned problems will be regularly posted on the course notice board; homework will **not** be accepted after the solutions have been posted! Your homework grade will be based on your homework, quizzes, and performance in the recitations and will be worth of 80 points.

**RECITATION:** Denoted by a number, these are on Wednesday and Friday. In the Wednesday recitations you will be asked to solve group exercises. Your recitation instructor may spend a portion of the Wednesday recitation on that week's laboratory. To get maximum benefit from this you should plan to read over the lab and attempt any prelab exercises ahead of time. Your recitation grade will be based solely on attendance and participation. The maximum recitation grade will be 60 points (for the 30 recitation meetings). This is intended to make recitation low-stress.

**LABORATORY:** Denoted by a letter, these occur either on Thursday or Friday. Here you will perform some fairly simple experiments designed to help you understand the course material. For all the labs you should spend some time **beforehand** reading the material so you will be prepared. Labs 2 and 5 have specific prelab exercises which are due at the beginning of the laboratory period. As mentioned above, labs and Prelabs will also be discussed at recitation meetings. You are required to do each laboratory, either during the assigned week or during one of the designated make up weeks. Should you perform an experiment outside your regular hour you must fill out a make up cover sheet which must also be signed by the instructor present. The instructor present must also sign and date the front page of your lab report. You should hand in both your completed lab report and the make up cover sheet to your regular laboratory instructor.

**HELP ROOM:** The Physics 106 Help Room is Room 53 Physics, in the front hallway of the building. It is shared with Physics 111 and 112, and various instructors from all those courses will share the staffing duties. The Help Room will be open approximately 9:00 a.m. to 5:00 p.m. Mondays through Fridays, but will occasionally not have a person on duty.

**COURSE GRADE:** Your course grade will be determined by your total score in the following areas:

Exam 1	100 points	<b>T Feb 14, 2006</b>
Exam 2	100 points	<b>T Apr 4, 2006</b>
FINAL	200 points	<b>R May 2, 2006 7:30 – 9:30 am (tentative)</b>
Recitation	60 points	
Homework	80 points	
Laboratory	<u>60 points</u>	
TOTAL	600 points	

This course will be graded on an absolute basis, not on a “curve.” The lowest A-, B-, C-, and D- are typically around 80%, 70%, 60% and 50%, respectively. The actual percentages may have to be adjusted downward but are guaranteed not to be higher. You can get extra credit from the in class exercises.

***YOU ARE EXPECTED TO COMPLETE ALL LABORATORY EXPERIMENTS IN ORDER TO GET A PASSING GRADE FOR THE COURSE. IF YOU MISS EVEN A SINGLE EXPERIMENT YOU RISK GETTING A FAILING GRADE REGARDLESS OF YOUR PERFORMANCE ON OTHER PARTS OF THE COURSE.***

**EXAMS:** All examinations are held in the lecture room, Room 5 Physics Hall. They are scheduled on the days indicated at the normal lecture hour. No formulae will be provided. You will however, be permitted to bring in handwritten notes. You will be allowed to use calculators. More details will be given prior to each exam. To study for an exam, review your lecture notes and text to make sure that you understand the physics principles and concepts and their relationship with each other. For applications, review the example problems given in lecture, recitation and in the text and your homework problems. The exams will consist of multiple-choice questions and machined-graded answer (bubble) sheets will be used. The final exam in Physics 106 is comprehensive.

**POLICY FOR MAKEUP TESTS:** Make-up tests are a privilege, not a right. Make-ups will be allowed only in exceptional circumstances, such as illness or family emergencies. Students who know in advance that they will miss a test must explain the circumstances and seek permission for a make-up from the lecture instructor well before the missed exam. Students who miss tests because of unexpected illness or other unforeseen emergencies should try to send a message (by phone, e-mail, or through a friend) to the lecture instructor or to the course secretary before the start time of the exam in order to receive permission to take the make-up exam. Only in exceptional circumstances will a student be permitted to take a make-up exam after the start times of the exam.

**ACADEMIC HONESTY:** The Department of Physics and Astronomy does not tolerate academic dishonesty. You may, and indeed are encouraged to do your homework and laboratory preparation together. Furthermore, you will work in groups in the lab. However, anything you turn in must be done by yourself, expressed in your own words, and must fairly represent your best understanding of the material. ***ACADEMIC DISHONESTY IN ANY FORM WILL NOT BE TOLERATED AND WILL AUTOMATICALLY LEAD TO A FAILING GRADE.***

**SYLLABUS:** The following syllabus indicates what we will be doing each week of the semester. The reading assignment refers to material, which you should have read before the indicated lecture. Jot down any questions that come to mind and ask them before, **during**, or after the lecture. The recitation assignment indicates the problems you should attempt to do. It is a good idea to do them well before they are due so that you can come and get help if you get stuck and can then come to recitation class better prepared. The lecture notes will be posted in the Physics 106 web site, before the lecture is given.

**ABOUT THIS COURSE:** The emphasis in this course will be on learning the important concepts and laws of physics and on using them to solve problems.

Many students think that the way to solve physics problems is to memorize a lot of formulas and learn to use a calculator to plug numbers into those formulas. This is not the way to solve physics problems, and it will not work for the homework and exams in this course.

What you must do is learn the concepts of physics and learn a few key mathematical equations, mainly definitions and important laws of physics. Then you will be able to work out the homework problems and solve the exam questions. Nothing on the exams will require you to remember or derive a complex formula, and nothing on the exams will require heavy use of a calculator. The exams will test your knowledge of physics.

Week	Lecture	Reading Assignment	Recitation	Laboratory Assignment
1.	T Jan.10 Introduction	Ch 1: 1.1-1.5 Appendix A,B	W Jan.11 Start LAB 1	Complete LAB 1 Math & Measurements
	R Jan 12 Vectors,Newton's I & II Law, Equilibrium	Appendix C Ch 4: 4.1-4.2	F Jan.13 App: C E1,E5 Ch: 4 Q7,Q9,Q10 Ch: 4 E1,E8	
2.	T Jan 17 Mass & Weight Newton's III Law, Applications	Ch4: 4.3-4.5	W Jan.18 Ch: 4 Q18,Q24 Ch: 4 E10,E15,E17	LAB 2 Forces Pre-Lab only
	R Jan 19 Speed, Velocity and Acceleration Graphical Methods	Ch2: 2.1-2.4	F Jan.20 Ch2: Q9,Q18,Q19,Q21 Ch2: E2,E8,CP2	
3.	T Jan 24 Uniform Acceleration Vertical Motion	Ch2: 2.5 Ch3: 3.1-3.3	W Jan 25 Ch2: E15,CP4 Ch3: Q9,Q13,Q14 Ch3: E4, CP2,CP3	LAB 2 Forces
	R Jan 26 Projectile Motion	Ch3: 3.4-3.5	F Jan 27 Ch3: Q17,Q23 Ch3: E7,E11,E16	
4.	T Jan 31 Torque Simple Machines, Work, Power Kinetic Energy	Ch8: 8.2 Ch6: 6.1-6.2	W Feb 1 Ch8: Q10,E8,E9 Ch6: Q1,Q2,Q12 Ch6: E2,E6,CP2	LAB 3 Torque
	R Feb 2 Potential Energy Energy Conservation Linear Momentum Impulse	Ch6: 6.3-6.4 Ch7: 7.1	F Feb 3 Ch6: Q17,E12,E14 Ch7: Q3,E5,E6	
5.	T Feb 7 Momentum Conservation Inelastic and Elastic Collisions	Ch7: 7.2-7.4	W Feb 8 Ch7: Q14,Q27 Ch7: E11,E12,CP5	LAB 4 Simple Machines
	R Feb 9 Review		F Feb 10 Review	
6.	<b>T Feb 14 Exam 1</b>		W Feb 15 Go over Exam 1	LAB 5 Pressure & Density
	R Feb 16 Pressure, Archimedes Principle	Ch9: 9.1-9.3	F Feb 17 Ch9: Q3,Q4,Q17 Ch9: E5,E11,CP3	

Week	Lecture	Reading Assignment	Recitation	Laboratory Assignment
7.	T Feb 21 Temperature and Specific Heat, First Law of Thermodynamics	Ch10: 10.1-10.3	W Feb 22 Ch10: Q7,Q13 Ch10: E6,CP3,CP4	Make Up
	R Feb 23 Gases,Heat Flow	Ch10: 10.4-10.5	F Feb 24 Ch10: Q21,Q27 Ch10: E14,E15,CP5	
8.	T Feb 28 Electric Charge,Coulombs Law, Conductors and Insulators	Ch12: 12.1-12.3	W Mar 1 Ch12: Q5,Q18 Ch12: E1,E5,E6,E7	LAB 6 Latent & Specific Heat
	R Mar 2 Electric Fields and Potential	Ch12: 12.4-12.5	F Mar 3 Ch12: Q20,Q24,Q29 Ch12: E10,E16,CP1	
9.	T Mar 7 Electric Current, Ohms Law, Series Circuits	Ch13: 13.1-13.3	W Mar 8 Ch13: Q1,Q5,Q13 Ch13: E2,E6,E9	LAB 7 Heat Transfer
	R Mar 9 Parallel Circuits, Electric Energy & Power	Ch13: 13.3-13.4	F Mar 10 Ch13: Q14,Q16 Ch13: E11,E14,CP1	
Spring Break No Classes - March 13-17				
10.	T Mar 21 Alternating Current, Magnets	Ch13: 13.5 Ch14: 14.1-14.2	W Mar 22 Ch13: Q28,Q29,CP5 Ch14: Q1,Q4	LAB 8 Simple Circuits
	R Mar 23 Magnetic Forces and Effects on Moving Charges and Currents	Ch14: 14.2-14.3	F Mar 24 Ch14: Q10,Q12 Ch14: E6,CP1a)-d)	
11.	T Mar 28 Faraday's and Lenz's Law, Generators and Transformers	Ch14: 14.4-14.5	W Mar 29 Ch14: Q25,Q29 Ch14: E10,E12,E13,E15,CP4	LAB 9 Magnetism
	R Mar 30 Review		F Mar 31 Review	
12.	T Apr 4 Exam 2		W Apr 5 Go over Exam 2	LAB 10 Practical Circuits
	R Apr 6 Wave properties, Waves on a Rope, Standing Waves	Ch15: 15.1-15.3	F Apr 7 Ch15: Q2,Q10,Q21 Ch15: E4,E7,CP2	
13.	T Apr 11 Sound and Electromagnetic Waves	Ch15: 15.4 Ch16: 16.1	W Apr 12 Ch15: Q26,Q28 Ch15: E9,CP3 Ch16: Q3,E1,E2,E4	LAB 11 Home Wiring
	R Apr 13 Interference Diffraction	Ch16:16.2-16.4	F Apr 14 Ch16: Q6,Q12,Q15,Q18,Q21 Ch16: E5,E8,E13,CP1	

<b>Week</b>	<b>Lecture</b>	<b>Reading Assignment</b>	<b>Recitation</b>	<b>Laboratory Assignment</b>
14.	T Apr 18 Reflection Refraction	Ch16: 17.1-17.3	W Apr 19 Ch17: Q2,Q3,Q6 Ch17: E1,E2,E4	LAB 12 Optics
	R Apr 20 Optical Systems, Lenses	Ch16: 17.4-17.5	F Apr 21 Ch17: Q26,Q27,Q28,Q29 Ch17: E5,E8,CP3	
15.	T Apr 25 Bohr Atom	Ch18: 18.1-18.5	W Apr 26 Ch18: E5,E7,E9,E11,E12	Make Up
	R Apr 27 Review		F Apr 28 Review	

**Final Exam.** Tentative date **May 2, 2006 7:30 – 9:30 am**